[0049] Based on the results of texture property determination **150** and shape property determination **160**, object removal **170** operates by further removing texture sections from the texture decision map corresponding to objects that do not have the texture property value within a first predetermined range and the shape property value within a second predetermined range. Simply put, objects that do not have both an appropriate texture property value and shape property value are removed from the texture decision map. The first and second predetermined ranges both correspond to proper ranges of valid monetary banknotes to ensure accuracy. The resulting texture decision map therefore displays verified areas corresponding to monetary banknotes in the scanned image.

[0050] A detailed description for each of the above identified process steps shown in FIG. **1** will be discussed below, including relevant figures and diagrams for each section.

[0051] Image Division **110**

[0052] The goal of image division **110** is to divide a scanned image into multiple verification sections for computational efficiency. Each verification section can then be processed individually, as opposed to an entire image, to provide for a greater resolution in related calculations and processes. The size and shape of the verification sections can vary according to various embodiments of the present invention, and in no way or form influence the teachings provided herein below. FIG. **2** illustrates an exemplary embodiment of a scanned image divided into a plurality of verification sections **210**. The plurality of verification sections **210** comprises several individual verification sections **214**. Although FIG. **2** illustrates the image divided into a fitted manner, other embodiments may employ an overlapping distribution, such as shown in FIG. **3**. This exemplary embodiment illustrates where the plurality of verification sections are overlapping, to provide an even greater resolution for following calculations and procedural steps.

[0053] Banknote Boundary Map Generation **120**

[0054] Banknote boundary map generation **120** focuses on the creation of a banknote boundary map. FIG. **4** illustrates this process. The banknote boundary map is derived from the scanned image containing monetary banknotes. Border sections, which correspond to a boundary of monetary banknotes within the scanned image, are selected and identified. Thus the banknote boundary map highlights the perimeter boundary areas of monetary banknotes if they are included in an original image scan.

[0055] FIG. **4** provides an exemplary embodiment describing how to generate the banknote boundary map according to the present invention. As many methods may exist, the description below is provided for illustrative purposes, and is not intended to reduce to scope of the present invention. Alternate embodiments of the present invention may also generate the banknote boundary map in different manners or a different order than illustrated. Therefore, any applicable method may be used as long as it suffices in producing a banknote boundary map in accordance with the goals of the present invention.

[0056] From FIG. **4**, a digitally scanned image is first received. Image division **410** then occurs, where the scanned image is divided into a plurality of image sections. Color feature map generation **420** then follows, where a color feature map is created containing color histogram data for each image section. Binary decision map generation **430** is an additional step included in an alternate embodiment of the present invention. A color binary decision map is created in this step, indicating probable areas in the image corresponding to the banknotes. The next step is gray level map generation **440**, where a gray level feature map is created to indicate a gray level value for each image section. Banknote boundary map generation **250** follows, where border sections are recorded onto a banknote boundary map. The border sections are chosen from the image sections having color histogram data within a predetermined color range and gray levels within a predetermined gray level range. The internal border sections enclosed by perimeter border sections are then removed from the banknote boundary map in the banknote main body block removal **460** step. Finally, perimeter border sections are dilated on the banknote boundary map in the banknote boundary dilation **470** step.

[0057] Each relevant section above in banknote boundary map generation process illustrated in FIG. **4** is further detailed below.

[0058] Image Division **410**

[0059] During Image division **410** from FIG. **4**, the received image is divided into a plurality of image sections. This can be performed in a manner similar to FIG. **2** and FIG. **3** as shown for the verification sections, and therefore does not require further discussion. In certain embodiments, the image sections may also correspond to the verification sections. The division of the input image into image sections simply allows for increased computational efficiency in the banknote boundary map generation step. The image sections can be arbitrarily shaped as blocks, or any other configuration, be fitted, or overlapping, so long as the teachings of the present invention are maintained.

[0060] Color Feature Map Generation **420**

[0061] Color feature map generation **420** entails generating a color feature map containing color histogram data for each image section. An example of color histogram data is provided in FIG. **5** and FIG. **6**. As shown in FIG. **5**, histogram data for each respective color (**510**, **520**, **530**) comprises a width value, and a median value. In an embodiment of the present invention illustrated through FIG. **6**, each image section **614** of the scanned image **610** comprises a width and median value for the color histogram for a first color **510**, a width and median value for the color histogram for a second color **520**, and a width and median value for the color histogram for a third color **530**. The color histogram data can comprise red green blue (RGB) color histogram data. As the extraction of color histogram data is well known to those familiar in the related art, further detail is omitted for brevity.

[0062] Gray Level Map Generation **440**

[0063] In gray level map generation **440**, a gray level feature map is created that indicates a gray level value for each image section. An exemplary illustration is shown in FIG. **7**. Each image section of the image is analyzed, and processed to determine a corresponding gray level for the section. As monetary banknotes typically possess a unique gray level within a specified variance level, this data is used in later processes of boundary detection. Gray level analysis is well known to those involved in the related art, and therefore further discussion in this regard is omitted.

[0064] Banknote Boundary Map Generation **450**

[0065] Banknote boundary map generation **450** is a pivotal step in which border sections are determined from data in the previous steps, mainly the color feature map from **420**, and the gray level map from **440**. In this step, image sections